



The UK Health Security Agency's (UKHSA) Personal Dosimetry Service provides extremity dosimetry based on alternative forms of thermoluminescent dosimeter (TLD). These are the finger stall and the ring.

The dosimeters are designed to measure doses from X-, beta and gamma radiations to the skin of the body's extremities (hands and feet) in terms of the radiation quantity $H_p(0.07)$, the dose equivalent at a depth of 0.07 mm, as required by the Health & Safety Executive (HSE).

Specification overview

The dosimeters are issued as part of the UKHSA TLD dosimetry service, which is approved by the HSE under Regulation 36 of the Ionising Radiations Regulations 2017.

The performance of the two types of dosimeters are very similar, however the finger stall is preferred where low-energy radiations are used. The dosimeter elements are produced by Harshaw TLD™, part of Thermo Fisher Scientific, and are individually bar coded.

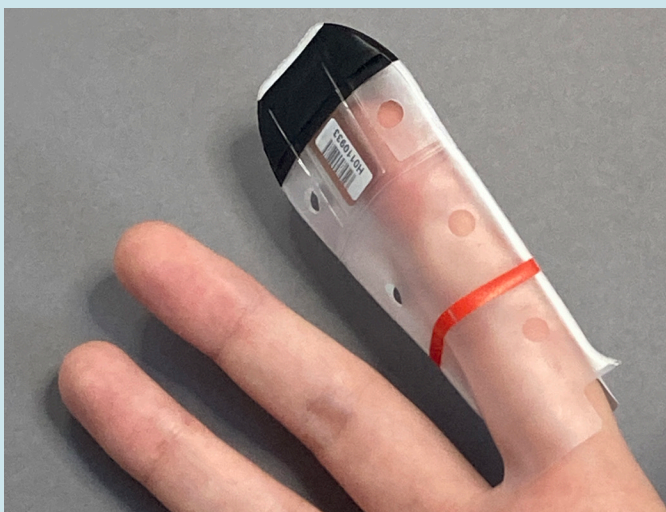
Finger stall dosimeters are available in two sizes. The dosimeter element is of the Harshaw EXTRAD™ type and is a small strip of Kapton™ foil containing a thin layer of sensitive lithium fluoride powder at one end.

The standard finger stall is made of PVC, with a black section covering the sensitive element. For users of very low energy beta emitters (those with maximum energies <500 keV), a variant is available with a very thin aluminised plastic covering.

Ring dosimeters are provided in a single, adjustable format. The dosimeter element is of the Harshaw DXTRAD™ type, and is a small metal annulus, backed with Kapton™ and containing a thin layer of sensitive lithium fluoride powder. The element is covered by a flattened plastic dome with a thin window.

Thermoluminescent materials store the energy they absorb from ionising radiation until they are heated to approximately 250°C, when the energy is released as light. The amount of light released is proportional to the radiation dose. When the dosimeters are returned for processing, the sensitive elements are removed and placed in special carriage cards. The cards are then fed into an automated TLD reader which identifies the dosimeter, heats it to the required temperature, and measures the light output.

The dosimeters must be used with the sensitive elements facing the predominant direction of the radiation: i) for finger stalls, the bar code should face the source; ii) for finger rings, the domed dosimeter housing should face the source.



Finger stall dosimeter



Ring dosimeter

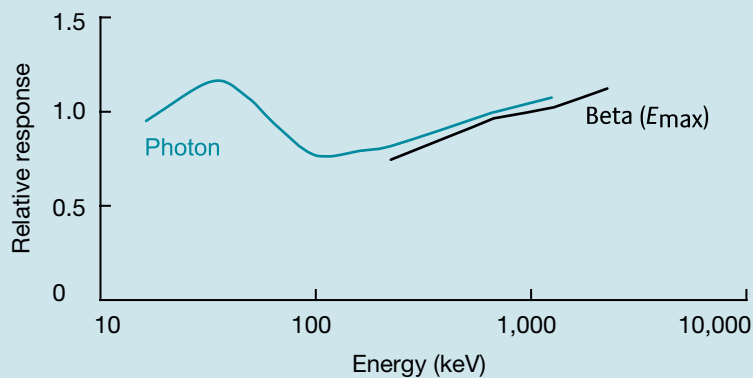
The extremity dosimeter service is just one of the approved dosimetry services offered by the UK Health Security Agency and can be linked to our dose record keeping service via an automated system. The processing laboratory is based at our centre in Oxfordshire. For further information or to place an order please contact:
 Tel: +44 (0)1235 825240
 Email: personaldosimetry@phe.gov.uk or personaldosimetry@ukhsa.gov.uk
www.ukhsa-protectionservices.org.uk/pds

Technical specification

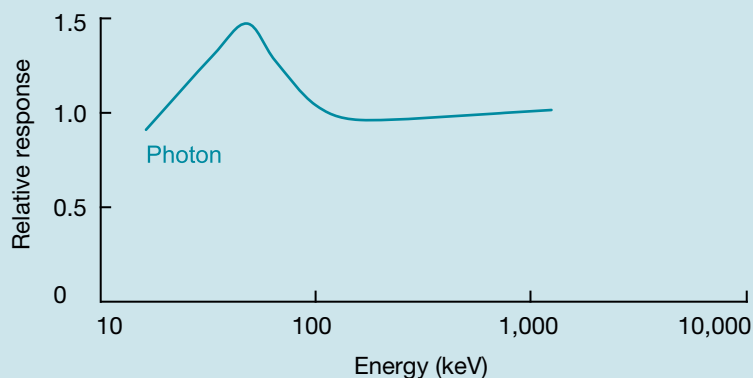
Material	^7LiF (Mg,Cu,P)
Dose range	0.15 mSv to 10 Sv
Change interval	Standard periods of 1, 2 or 3 months Periods of 2, 4, 8 or 13 weeks also available

Energy response

Finger stall -25% to +15% for photon radiations from 16 keV to 1250 keV and for beta radiations of E_{max} from 224 keV to 2280 keV



Ring -10% to +20% for photon radiations from 20 keV to 1250 keV and $\pm 30\%$ for beta radiations of E_{max} from 1000 keV to 2280 keV



Finger stall	Within $\pm 10\%$ up to 90° for photon radiations and $\pm 20\%$ up to 60° for beta radiations
Ring	Within $\pm 25\%$ up to 60° for photon radiations and $\pm 45\%$ up to 60° for beta radiations

Measurement uncertainties

The extremity dosimeters are subject to measurement uncertainties which comply with the recommendations given in European Commission report Radiation Protection 160: Technical Recommendations for Monitoring Individuals Occupationally Exposed to External Radiation.

In HSE performance tests, the overall relative standard deviation and overall bias are typically 10%, well within the permitted values of 15% and 20%, respectively.

Special features

Energy threshold
 The finger stall dosimeter has an exceptionally low beta energy detection threshold of 224 keV (E_{max}).

Environmental effects
 The dosimeters may be worn in all normally encountered environments. In tests, no effect was found for 48 hours' exposure at 40°C and 90% relative humidity. Prolonged exposure to strong ultraviolet light (including sunlight) should be avoided.

Sizes to suit all
 The extremity dosimeter is available in a range of styles to fit everyone. The finger stall is available in small (diameter up to 20mm) and large (up to 24mm) sizes and the ring dosimeter is adjustable up to a diameter of 29mm.